REMARKS

After the present response, claims 24-26 and 28-48 remain in the present application. Reconsideration and allowance of outstanding claims 24-26 and 28-48 in view of the following remarks are requested.

A. Rejections of Claims 24-26 and 28-48 under 35 USC §103(a)

The Examiner has rejected claims 24-26 and 28-48 under 35 USC §103(a) as being obvious with respect to Japanese Patent Number JP 402262308A to Yokogawa ("Yokogawa"), U.S. Patent Number 6,069,397 to Cornett et al. ("Cornett"), and U.S. Patent Number 5,446,311 to Ewen et al. ("Ewen"). For the reasons discussed below, Applicants respectfully submits that the present invention, as defined by independent claims 24, 31, and 37, is patentably distinguishable over Yokogawa, Cornett, and Ewen.

The present invention, as defined by independent claims 24 and 37, teaches, among other things, a conductor or inductor patterned in a second area of a dielectric, where a permeability conversion material is interspersed within the second area of the dielectric such that the permeability of the second area of the dielectric is higher than the permeability of a first area of the dielectric, and where the first area of the dielectric is not situated underneath or over the conductor or inductor and the second area of the dielectric is not situated over the conductor or inductor. The permeability conversion material is interspersed within the second area of the dielectric such that the permeability of the second area of the dielectric is increased, while a mask prevents the permeability

conversion material from entering the first area of the dielectric, which is situated adjacent to but not situated over or underneath the second area of the dielectric.

Consequently, by increasing the permeability of an area of a dielectric by interspersing permeability conversion material within the dielectric area and masking another adjacent area of the dielectric so as to prevent the permeability conversion material from entering that area, the present invention advantageously achieves control over the particular area of the dielectric in which the permeability conversion material is dispersed. As an example, the permeability conversion material may be dispersed only in an area of the dielectric that includes an inductor, and not in a neighboring dielectric area of the same dielectric layer.

Moreover, by interspersing the permeability conversion material within the second area of the dielectric, the amount of permeability conversion material can be advantageously controlled to achieve a desired increase in the permeability of the second area of the dielectric after patterning of an inductor in the second area of the dielectric. Since increasing the permeability of the second area of the dielectric increases the inductance of the inductor patterned in the second area, the present invention advantageously allows the inductance of an on-chip inductor to be increased without increasing the size of the inductor.

In contrast to the present invention as defined by independent claims 24 and 37, Yokogawa does not disclose, teach, or suggest a conductor or inductor patterned in a second area of a dielectric, where a permeability conversion material is interspersed

within the second area of the dielectric such that the permeability of the second area of the dielectric is higher than the permeability of a first area of the dielectric, and where the first area of the dielectric is not situated underneath or over the conductor or inductor and the second area of the dielectric is not situated over the conductor or inductor. Yokogawa specifically discloses inductor 2, which includes spiral type coil 3 sandwiched between insulating layers 4. See, for example, the constitution and Figures 1 and 2 of Yokogawa. In Yokogawa, a first area of insulating layer 4 (which the Examiner refers to as first area of dielectric 4) is situated over the coil 3 (which the Examiner refers to as a conductor).

Referring to Yokogawa, high permeability magnetic substance 5 is situated above one of insulating layers 4 and high permeability magnetic substance 6 is situated underneath one of insulating layers 4. See, for example, the constitution and Figure 2 of Yokogawa. In Yokogawa, spiral type coil 3 is apparently patterned in a dielectric area, which is indicated by a white area situated between windings of spiral type coil 3. See, for example, Yokogawa, Figure 2. Thus, in Yokogawa, the dielectric area in which spiral type coil 3 is patterned (indicated by the white area situated between windings of spiral type coil 3) is situated between insulating layers 4.

The Examiner states, correctly, that Yokogawa does not teach the material of the first area of dielectric 4 and the material of the second area of dielectric. Yokogawa fails to disclose, teach, or suggest a first area of a dielectric including a conductor or inductor, where permeability of a second area of the dielectric is higher than the permeability of the first area of the dielectric, and where the first area of dielectric is not situated underneath

or over the conductor or inductor and the second area of the dielectric is not situated over the conductor or inductor. Furthermore, in Yokogawa, the inductance of spiral type coil 3 is increased by sandwiching it between high permeability magnetic substances 5 and 6, which have large magnetic flux density. See, for example, the constitution and Figure 2 of Yokogawa.

In contrast to Yokogawa, in embodiments according to the present invention, the inductance of the inductor can be advantageously increased by increasing the permeability of the dielectric layer in which the inductor is patterned. Additionally, Yokogawa provides no motivation for patterning spiral type coil 3 in a dielectric comprising magnetic oxide, as the Examiner suggests. In fact, patterning spiral type coil 3 in magnetic oxide rather than a dielectric such as silicon oxide would have to be beneficial enough to offset the likely increase in manufacturing cost.

Yokogawa does not disclose, teach, or suggest the configuration of independent claims 24 and 37. Furthermore, there is no teaching or suggestion to combine or modify Yokogawa. Therefore, Yokogawa, singly or in combination with other art of record, does not disclose, teach, or suggest the present invention as defined by independent claims 24 and 37.

Cornett does not cure the deficiencies of Yokogawa. Cornett is directed to an integrable circuit inductor formed from a patterned conductive material that has a major portion completely encapsulated by a material that is substantially electrically non-conductive, and that has a magnetic response at the operating frequency of the inductor.

The Examiner states, correctly, that Cornett does not teach that the second permeability of magnetic oxide layers 221, 223 is greater than the first permeability of passivation/dielectric layer 217 and that Cornett does not teach that the conventional passivation/dielectric layer 217 comprises silicon dioxide. In contrast to the present invention as defined by amended independent claims 24 and 37, Cornett does not teach, disclose, or suggest a conductor or inductor patterned in a second area of a dielectric, where a permeability conversion material is interspersed within the second area of the dielectric such that the permeability of the second area of the dielectric is higher than the permeability of a first area of the dielectric, and where the first area of the dielectric is not situated underneath or over the conductor or inductor and the second area of the dielectric is not situated over the conductor or inductor. Cornett discloses inductor layer 220 including patterned conductive trace 110, which is embedded within magnetic material layers 221 and 223. See, for example, column 2, lines 18-21 and Figure 2 of Cornett. Thus, in Cornett, magnetic material layer 223, which comprises an insulative magnetic material, is situated over patterned conductive trace 110.

Further, Cornett fails to disclose, teach, or even suggest a first area of a dielectric including a conductor or inductor, where permeability of a second area of the dielectric is higher than the permeability of the first area of the dielectric, and where the first area of dielectric is not situated underneath or above the conductor or inductor and the second area of the dielectric is not situated over the conductor or inductor. Cornett discloses a magnetic material, such as amorphous copper ferrite, which is electrically non-conductive

but provides a magnetic response at radio or microwave frequencies and is utilized in inductor layer 220. See, for example, Cornett, column 2, lines 52-59. However, Yokogawa does not teach, disclose, or suggest or provide any motivation for patterning spiral type coil 3 in a layer comprising magnetic material as disclosed in Cornett.

As discussed herein, in Yokogawa, the inductance of spiral type coil 3 is increased by sandwiching spiral type coil 3 between high permeability magnetic substances 5 and 6. As a consequence, Cornett fails to cure the basic deficiencies of Yokogawa as discussed above.

Cornett does not disclose, teach, or suggest the configuration of independent claims 24 and 37. Furthermore, there is no teaching or suggestion to combine or modify Cornett. Therefore, Cornett, singly or in combination with other art of record, does not disclose, teach, or suggest the present invention as defined by independent claims 24 and 37.

Ewen does not cure the deficiencies of Yokogawa and Cornett. Ewen relates to a monolithic high-Q inductor structure. The structure is formed with multiple metallization levels in a conventional integrated circuit technology in which inductor turns utilize these multiple levels to reduce the inductor resistance.

In contrast to the present invention as defined by amended independent claims 24 and 37, Ewen does not disclose, teach, or even suggest a conductor or inductor patterned in a second area of a dielectric, where a permeability conversion material is interspersed within the second area of the dielectric such that the permeability of the second area of

the dielectric is higher than the permeability of a first area of the dielectric, and where the first area of the dielectric is not situated underneath or over the conductor or inductor and the second area of the dielectric is not situated over the conductor or inductor.

The Examiner asserts that Ewen discloses a passivation/dielectric layer comprising silicon oxide. However, Ewen combined with Cornett fails to overcome the deficiencies of Yokogawa as discussed above. Additionally, Ewen fails to disclose, teach, or suggest a first area of a dielectric including a conductor or inductor, where permeability of a second area of the dielectric is higher than the permeability of the first area of the dielectric, and where the first area of dielectric is not situated underneath or above the conductor or inductor and the second area of the dielectric is not situated over the conductor or inductor.

Referring to independent claim 31, an inductor is patterned in a dielectric having a first permeability and a permeability conversion material having a second permeability interspersed within the dielectric, where the second permeability is greater than the first permeability, and where the dielectric is not situated underneath or over the inductor. The permeability conversion material is interspersed within the dielectric to increase the permeability of the dielectric. The fact that a permeability conversion material is interspersed within a dielectric, where the permeability of the permeability conversion material is greater than the permeability of the dielectric, where the inductor is patterned in the dielectric prior to the dielectric receiving interspersed permeability conversion

material, and where the dielectric is not situated underneath or over the inductor, results in various advantages discussed herein.

As such, and based on the foregoing reasons in relation to amended independent claims 24 and 37, independent claim 31 is also patentably distinguishable over Yokogawa, Cornett, and Ewen. Thus, claims 32-36 depending from independent claim 31 are also patentably distinguishable over Yokogawa, Cornett, and Ewen for at least the reasons presented above and also for additional limitations contained in each dependent claim.

For the foregoing reasons, Applicants respectfully submit that the present invention as defined by independent claims 24, 31, and 37 is not taught, disclosed, or suggested by the art of record. Thus, independent claims 24, 31, and 37 are patentably distinguishable over the art of record. As such, the claims depending from independent claims 24, 31, and 37 are, *a fortiori*, also patentable for at least the reasons presented above and also for additional limitations contained in each dependent claim.

B. **Conclusion**

Based on the foregoing reasons, the present invention, as defined by independent claims 24, 31, and 37 and the claims depending therefrom, is patentably distinguishable over the art cited by the Examiner. Thus, claims 24-26 and 28-48 are patentably distinguishable over the art cited by the Examiner. As such, and for all the foregoing

reasons, an early Notice of Allowance directed to all claims 24-26 and 28-48 remaining in the present application is respectfully requested.

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